Amendment to the Claims:

This listing of claims 49-88 will replace all prior versions, and listing of claims in the application.

Listing of Claims

1. — 48. (Cancelled)

49. (Currently Amended) An interferometric apparatus for performing optical spectroscopy with high spectral resolution in a compact arrangement, the apparatus comprising:

(a) means for coupling in a single spatial mode of an incoming light field to be examined;

(b) means for splitting said single spatial mode of said incoming light field into at least two ~~subfields~~ partial fields;

(c) means for changing ~~one of a shape or a direction of propagation of~~ the wavefront of at least one of said at least two ~~subfields~~ partial fields in dependence on the wavelength;

(d) means for generating an interference pattern by superimposing said at least two ~~subfields~~ partial fields;

(e) detection and analysis means to record and evaluate said interference pattern at a plurality of discrete spatial positions in order to derive spectral properties of said incoming light field.

50. (Currently Amended) An interferometric apparatus in accordance with claim 49, wherein said detection and analysis means to record and evaluate said interference pattern comprises detection means for recording an intensity of said

~~modified~~ interference pattern at a plurality of discrete spatial positions; and numerical analysis means for reconstructing an optical spectrum or spectral properties of said incoming light field by performing calculations on said recorded intensities.

51. (Previously Presented) An interferometric apparatus in accordance with claim 49, wherein said detection and analysis means to record and evaluate said interference pattern comprises detection means for recording a weighted sum of the intensities of said interference pattern at a plurality of discrete spatial positions in order to identify an optical spectrum or spectral properties of said incoming light field according to a predetermined set of said weights.

52. (Previously Presented) An interferometric apparatus in accordance with claim 51, wherein said detection means for recording a weighted sum of the intensities includes a spatial mask which correlates with at least one generated interference pattern to be detected.

53. (Previously Presented) An interferometric apparatus in accordance with claim 52, wherein said spatial mask is one of a fixed form and a changeable form.

54. (Cancelled).

55. (Currently Amended) An interferometric apparatus in accordance with claim 49, wherein said means for splitting said single spatial mode of said incoming light field into said at least two ~~subfields~~ <u>partial fields</u> further comprises means for dividing the amplitude of said single spatial mode of said incoming light field into at least two ~~subfields~~ <u>partial fields</u>.

56. (Currently Amended) An interferometric apparatus in accordance with claim 49, wherein said means for splitting said single spatial mode of said incoming light field to at least two ~~subfields~~ partial fields further comprises means for dividing the wavefront of said single spatial mode of said incoming light field into said at least two ~~subfields~~ partial fields.

57. (Previously Presented) An interferometric apparatus according to claim 49, wherein said means for coupling in said single spatial mode of an incoming light field to be examined, comprises a spatial filter configured to permit a single spatial mode.

58. (Previously Presented) An interferometric apparatus according to claim 49, wherein said means for coupling in said single spatial mode of an incoming light field to be examined, further comprises an optical mono mode fiber.

59. (Currently Amended) An interferometric apparatus according to claim 49, wherein said means for changing the shape or the direction of propagation of the wavefront of at least one of said two ~~subfields~~ partial fields in dependence on the wavelength comprises a spectrally dispersive optical element.

60. (Currently Amended) An interferometric apparatus according to claim 9, wherein said means for changing the shape or the direction of propagation of the wavefront of at least one of said two ~~subfields~~ partial fields in dependence on the wavelength comprises a diffractive optical

61. (Previously Presented) An interferometric apparatus in accordance with claim 60, wherein said diffractive optical element has non-periodic diffraction structures.

62. (Currently Amended) An interferometric apparatus in accordance with claim 60,wherein said diffractive element is selected from the group consisting of~~comprising~~: a multiplex grating, a multiplex hologram, a holographic optical element, and a computer-generated hologram.

63. (Currently Amended) An interferometric apparatus in accordance with claim 49, wherein said means for splitting said single spatial mode of an incoming light field into said at least two ~~subfields~~ partial fields and said means for changing the shape or the direction of propagation of the wavefront of at least one of said two ~~subfields~~ partial fields in dependence on the wavelength share at least one common optical element.

64. (Previously Presented) An interferometric apparatus in accordance with claim 49, wherein the detection means is configured to move through the interference pattern with respect to a single spatial degree of freedom for recording an intensity of said interference pattern at said plurality of discrete spatial positions.

65. (Previously Presented) An interferometric apparatus in accordance with claim 49, wherein the detection means is moved through the interference pattern with respect to two spatial degrees of freedom for recording an intensity of said interference pattern at said plurality of discrete spatial positions.

66. (Previously Presented) An interferometric apparatus in accordance with claim 49, wherein the interference pattern is directed onto the detection means via optical elements moveable with respect to one spatial degree of freedom for recording an intensity of said interference pattern at said plurality of discrete spatial positions of said interference pattern.

67. (Previously Presented) An interferometric apparatus in accordance with claim 49, wherein the interference pattern is directed onto the detection means via optical elements moveable with respect to two spatial degrees of freedom for recording an intensity of said interference pattern at said plurality of discrete spatial positions of said interference pattern.

68. (Currently Amended) An interferometric apparatus in accordance with claim 49, wherein the detection means is one of a spatially one-dimensional resolving detector or a one-dimensional detector array for recording said intensities of said ~~modified~~ interference pattern at said plurality of discrete spatial positions.

69. (Currently Amended) An interferometric apparatus in accordance with claim 49, wherein the detection means is one of a spatially two-dimensional resolving detector or a two-dimensional detector array for recording said intensities of said ~~modified~~ interference pattern at said plurality of discrete spatial positions.

70. (Currently Amended) An interferometric apparatus in accordance with claim 49, further comprising means to change the optical path length for at least one of said ~~subfields~~ partial fields before being superimposed to generate said interference pattern.

71. (Currently Amended) An interferometric apparatus in accordance with claim 49, further comprising means to influence the optical path length for at least one of said ~~subfields~~ partial fields before being superimposed to generate said interference pattern~~,~~ in dependence on the wavelength.

72. (Currently Amended) An interferometric apparatus in accordance with claim 49, further comprising means to shift or modulate the relative phase of at least one of said at least two ~~subfields~~ partial fields with respect to at least one other of said at least two subfields being superimposed to generate said interference pattern.

73. (Currently Amended) An interferometric apparatus in accordance with claim 49, further comprising means to change or modulate a spatial position of at least one of said two ~~subfields~~ partial fields with respect to at least one other of said at least two ~~subfields~~ partial fields.

74. (Previously Presented) An interferometric apparatus in accordance with claim 49, further comprising means to change or modulate the spatial position of said single spatial mode of said incoming light field.

75. (Previously Presented) An interferometric apparatus in accordance with claim 49 further comprising means to form an optical resonator.

76. (Currently Amended) An interferometric apparatus in accordance with claim 75, wherein one or more of said means for changing one of a shape or a direction of propagation of the wavefront of at least one of said at least two ~~subfields~~ partial fields in dependence on the wavelength are arranged at the interior of said resonator.

77. (Currently Amended) An interferometric apparatus in accordance with claim 49, wherein said means for generating an interference pattern by superimposing said at least two ~~subfields~~ partial fields comprises one of a retroreflector or a right angle prism ~~dieder~~.

78. (Currently Amended) An interferometric apparatus in accordance with claim 49, wherein said means for generating an interference pattern by superimposing said at least two ~~subfields~~ partial fields further comprises means for rotating at least one optical component to adjust spatial frequencies of said generated interference pattern.

79. (Currently Amended) An interferometric apparatus in accordance with claim 78, wherein said means for rotating at least one optical component causes one of a simultaneous shift or modulation of the relative phase of at least one of said at least two ~~subfields~~ partial fields with respect to at least one other of said at least two ~~subfields~~ partial fields being superimposed to generate said interference pattern.

80. (Previously Presented) An interferometric apparatus in accordance with claim 49, wherein said apparatus further comprises one of a spectrally selective filter and a spectrally selective detector.

81. (Currently Amended) A method for determining one of an optical spectrum of a light field to be examined and spectral properties of the light field to be examined using an interferometric apparatus, the method comprising:

(a) coupling in a single spatial mode of said light field to be examined

(b) splitting said single spatial mode into at least two ~~subfields~~ partial fields

(c) generating an interference pattern by superimposing said at least two ~~subfields~~ partial fields

(d) changing ~~one of a shape or a direction of propogation of~~ the wavefront of at least one of said at least two ~~subfields~~ partial fields in dependence on the wavelength, thereby causing each different spectral component ~~with a discriminative wavelengths~~ of said single spatial mode of an incoming light field to generate a different of said interference pattern;

(e) calculating one of said optical spectrum or said spectral properties by numerical analysis of said numerical representation of said interference pattern by correlating said numerical representation of said interference with certain base patterns; wherein said base patterns correspond to numerical representations of said interference patterns for corresponding basic spectral features.

82. (Previously Presented) A method in accordance with claim 81 wherein said calculating step for performing a numerical analysis of said numerical representation of said interference patterns comprises performing one of: a Fourier transformation of said numerical representation, a Hartley transformation of said numerical representation, or a mathematical transformation to represent said interference pattern as a linear combination of sinus or cosinus functions.

83. (Currently Amended) A method in accordance with claim 81, wherein said calculating step for performing a numerical analysis of said numerical representation of said interference pattern comprises breaking down ~~decomposition of said numerical representation of~~ said interference pattern according to a set of base patterns dependent on said interferometric apparatus.

84. (Previously Presented) A method in accordance with claim 83, wherein said base patterns required for said decomposition are gained based on a measurement.

85. (Currently Amended) A method in accordance with claim 84, wherein the determination of said base patterns includes further includes the step of measuring the intensity of different interference patterns according to different relative phase positions of said ~~subfields~~ partial fields.

86. (Currently Amended) A method in accordance with claim 81, wherein said step of measuring the intensity of an interference pattern at a plurality of discrete spatial positions and said step of generating a numerical representation of said interference pattern using the values of said measurements of the intensity of said interference pattern further includes the step of measuring the intensity of different interference patterns according to different relative phase positions of said ~~subfields~~ partial fields~~.~~

87. (Currently Amended) A method in accordance with claim 83, such that respective numerical transformations ~~or functions of said numerical representation~~ of interference patterns and said base patterns are used instead of said numerical representation of interference pattern and said base patterns.

88. (Currently Amended) A method in accordance with claim 81, further comprising:

determining the difference of the optical path lengths of the ~~subfields~~ partial fields brought to interference for each of the said individual measurement points at a plurality of discrete spatial positions of said interference patterns

and

sorting the individual measured values in accordance to the difference of the optical path lengths of the partial fields brought to interference respectively determined from the measurement point.